



# Quality Control During Maintenance

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# I Organizing age old methods:

- ✱ Approval.
- ✱ Documenting.
- ✱ Ownership.
- ✱ Closeout.

# Approval:

- ✱ All jobs must be submitted and approved.
- ✱ Approval criteria includes:
  - ✱ Compatibility with other jobs.
  - ✱ Urgency.
  - ✱ Work plan.
  - ✱ Closeout testing 'procedure'.

# Documenting:

- ✱ Jobs are stored in a database for later reference.
- ✱ Can be re-called or referenced for repeat jobs.

# Ownership:

- ✦ For most jobs, affected systems will be assigned an 'owner'.
  - ✦ Included Job Submission/Work Plan.
  - ✦ Owners must agree that associated systems have recovered before the primary job can be completed.
- ✦ May have multiple owners
  - ✦ Examples are water systems repair, computer system repair upgrade, power outage.

# C-AD Maintenance Request System

## Main Menu

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## Useful Links

- Maintenance Request System

## Job Request - H & V SEXTUPOLE POWER SUPPLIES

*Job Status - Closed*

**Status:** Completed

**Group:** Power Supply (Booster/AGS)

Estimated Time: 1 hr

**Affected Machine:** `Booster`

**Job Title:** H & V SEXTUPOLE POWER SUPPLIES

**Contact(s):** JOE FUNARO, MIKE BANNON

**Requested** Next Available Maintenance  
**Date:**

**Ring Access:** Booster

Building Access: 930A

**Hazards:** N/A

Submitted On: Mar 9 2006 11:26AM

**Description:**

1.) REPLACE THE RECT ON LIGHT ON  
DYNAPOWER POWER SUPPLIES USED  
THE HORZ AND VERT SEXTUPOLE PO  
SUPPLIES. NO BOOSTER ACCESS REQ

**Impact Statement:**

N/A

## Comments / Additional Support:

N/A

**Closeout  
Feedback:**

- 1.) LOTO FDS'S FOR H & V SEXTUPOL BLDG 930A.
- 2.) REPLACED RECT ON LIGHT SOCKET BULBS WITH NEW MULTI-SEGMENT HR LIFE BULBS.
- 3.) GOT PERMISSION FROM JON SAN TO RE-ENERGIZE FDS
- 4.) RECT ON LIGHTS ON BOTH PS ARE OPERATIONAL.

day, May 30, 2006 1515 hrs

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Critical Jobs		
Group	Job Title	Time Required
Beam Components & Instrumentation	<a href="#">RHIC Abort Kicker Diagnostic Test</a>	8 hrs
Power Distribution	<a href="#">Exercise Subst 1004B&amp;C circuit breakers</a>	1 hr
Power Supply (RHIC)	<a href="#">Voltage monitoring work in sector 1</a>	6 hrs
Access Controls	<a href="#">Test Crash Operators at PHENIX</a>	1 hr

Critical Times and Essential Personnel		
Time	Job	Manpower
0730	<ul style="list-style-type: none"> <li>Begin AGS LOTO.</li> </ul>	2CAS
0800	<ul style="list-style-type: none"> <li>Dump RHIC store.</li> <li>Call STAR and request that they begin ramp down.</li> <li>Survey Dump areas, all other RHIC to RA.</li> <li>Open 8Z1 plug for crash test.</li> <li>CAS to STAR to rack out Main Supply.</li> </ul>	2 MCR 1 HP 2 Support
0830	<ul style="list-style-type: none"> <li>All RHIC to RA.</li> <li>Access AGS for Jump Target, RF Station C and DE and Survey. HP to enter with RF and instrumentation personnel, surveying each area sequentially.</li> <li>HP to survey AtR.</li> </ul>	1MCR 2HP
0900	<ul style="list-style-type: none"> <li>AtR to Restricted Access.</li> <li>Begin test of Substation 4B and C.</li> </ul>	
1300	<ul style="list-style-type: none"> <li>Sweep AtR.</li> </ul>	2 CAS
1430	<ul style="list-style-type: none"> <li>Sweep AGS.</li> </ul>	5 CAS/MCR
1530	<ul style="list-style-type: none"> <li>Begin RHIC Sweeps.</li> <li>Rack in STAR</li> </ul>	4MCR/CAS



# Duration and Start time of maintenance:

- ✱ The length of maintenance determined by longest critical job.
- ✱ Job may require specific start time.
  - ✱ Personnel considerations.
- ✱ Individual areas or machined are scheduled for testing as soon as possible.
  - ✱ Areas not associated with the critical job are swept and secured prior to the official end of maintenance.
- ✱ Some tests require that RHIC Sweeps completed.
  - ✱ Compatibility with experiments.



# Personnel Management:

- ✱ The Maintenance Coordinator shall direct personnel during the maintenance period.
- ✱ LOTO:
  - ✱ Time consuming.
  - ✱ Adds to beginning and end effects.
    - Delays all Booster and AGS jobs.
    - Uses personnel resources.
  - ✱ Potential failures.
  - ✱ Specific teams assigned for recovery.



# Handoff to operations:

- ✦ As machines become available, they are officially handed off to operations.

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## Maintenance Closeout

Maintenance Completed by 2030, RHIC Setup delayed until Midnight See below for details

## Maintenance Notes

Version: June 6 2006 0930hrs  
PWS

### Maintenance Closeout:

Maintenance Completed by 2030, Beam Setup was delayed until Midnight. See below for details.

### Maintenance Notes:

Factors in the delay of beam setup following the maintenance period of May 31 2006.  
Emergent jobs:

- The Ground fault search associated with Job 27 used more personnel and took more time than anticipated, in particular:
  - Affected jobs 16, and 48-51.
  - Personnel scheduled for other tasks had to be reassigned to this job
  - Affected sweep and LOTO schedules
  - Caused the loss of power for systems scheduled for maintenance and development (RHIC mains).
    - Jobs 55, 57, 31 and 32, 30 were affected.
  - Delayed overall maintenance and kept manpower idle while power was out.
  - Resulted in added time to jobs: Must employ Line Crew to throw disconnects in series with substation 4B.
    - Jobs delayed included 27, 33-36, 55 and 71.
  - Caused several preventable delays:

# Problems:

- ☀ Personnel.

- ☀ Not enough.
- ☀ Long hours.

- ☀ Schedule.

- ☀ No real PM time.
- ☀ Late starts.
- ☀ Unrealistic.
- ☀ Delays.

- ☀ Equipment failure during recovery.

- ☀ Unrelated failure: LOTO.
- ☀ Uncompleted checkout of Equipment.